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Marked-up Set of Claims (According to 37 CFR 1.173(b)(2))

1. (Eight times amended) A method for dewatering biological sludge [that has been digested by] from a thermophilic digestion process, comprising:

a. adding a polymeric quaternary ammonium compound[s], as primary component, to the biological sludge; and

b. adding a polyacrylamide to the biological sludge;

such that any combination[s] of the polymeric quaternary ammonium compound[s] and of the polyacrylamide[s] enhances dewatering of the sludge.

2. (Eight times amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound[s] is[are from] poly(di-allyl di-methyl ammonium chloride (DADMAC))[family].

3. (Nine times amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound[s] is[are from] poly(epichlorohydrin di-methyl amine (epi-DMA))[family].

4. (Three times amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge; and _____

_____, upon] following the formation of microflocs of the sludge from addition of the polymeric quaternary ammonium compound, a cationic polyacrylamide is added[to form a floc that dewateres the sludge].

5. (Three times amended) The method for dewatering biological sludge according to claim 4, wherein the polymeric quaternary ammonium compound and the cationic polyacrylamide are in an approximate[ly] 1:1 ratio, with the cationic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

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6. (Three times amended) The method for dewatering biological sludge according to claim 4, wherein the ratio[s] of [the]polymeric quaternary ammonium compound with respect to [the]cationic polyacrylamide range from about 1:10 to about 20:1.

7. (Twice amended) The method for dewatering biological sludge according to claim 4, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between about 50 ppm:1 percent and about 300 ppm:1 percent.

8. (Twice amended) The method for dewatering biological sludge according to claim 1, wherein the polymeric quaternary ammonium compound is added directly to the sludge, in an amount sufficient to cause formation of a cationic overcharge within a developed microfloc system, and wherein
the polyacrylamide is[and an] anionic[polyacrylamide is then added for final floc formation].

9. (Cancelled)

10. (Three times amended) The method for dewatering biological sludge according to claim 8, wherein the polymeric quaternary ammonium compound and the anionic polyacrylamide are in a approximate[ly] 10:1 ratio, with the anionic polyacrylamide having a higher molecular weight than the polymeric quaternary ammonium compound[does].

11. (Original) The method for dewatering biological sludge according to claim 10, wherein the anionic polyacrylamide is about 40% anionic.

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12. (Three times amended) The method for dewatering biological sludge according to claim 8, wherein the ratio[s] of the polymeric quaternary ammonium compound to the anionic polyacrylamide ranges from about 1:10 to about 20:1.

13. (Three times amended) The method for dewatering biological sludge according to claim 8, wherein the polymer concentration to solids ratio of total polymer dosage requirement in relationship to percentage of solids component of the sludge is between approximately 50 ppm:1 percent and approximately 300 ppm:1 percent.

14. (Original) The method for dewatering biological sludge according to claim 1, wherein the biological sludge is mixed with primary sludge.

15. (Nine times amended) [A composition]~~The method~~ for dewatering biological sludge according to claim 1, [comprising] wherein:
said polymeric quaternary ammonium compound[s, as primary component, and] is added along with said cationic polyacrylamide;[, and
said polymeric quaternary ammonium compound and said cationic polyacrylamide[components being] are added [present in the composition in a ratio]to enable dewatering of the biological sludge[the composition to function as an agent for dewatering biological sludge from a thermophilic digestion process].

16. (Seven times amended) The method for dewatering biological sludge according to claim 1, wherein the polyacrylamide and the polymeric quaternary ammonium compound[s are]is [used]added in solution [or in dry] form.

17 – 18. (Canceled)

19. (Three times amended) The method of claim 1, wherein said polyacrylamide is cationic or anionic.

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20 – 21. (Cancelled)

22. (Three times amended) A method for dewatering a sludge comprising water and solids, wherein the solids comprise thermophiles, the method comprising:

_____ contacting the sludge according to a technique selected from a group of techniques including:

_____ contacting the sludge with a polymeric quaternary ammonium compound along with a cationic polyacrylamide; and

_____ contacting the sludge first with a polymeric quaternary ammonium compound and then with a cationic polyacrylamide;

_____ to form a floc.

23. (Cancelled)

24. (Three times amended) The method of claim 22, wherein said polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and said cationic polyacrylamide comprises a cationic polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

25. (Twice amended) The method of claim 22, wherein said polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of said thermophiles; and wherein

_____ said cationic polyacrylamide is added in an amount sufficient to agglomerate the microflocs into flocs for dewatering.

26. (Five times amended) The method of claim 22, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

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27. (Twice amended) The method of claim 25, wherein the ratio of said polymeric quaternary ammonium compound to said cationic polyacrylamide is in the range of about 1:10 to about 20:1.

28. (Three times amended) The method of claim 25, wherein the concentration of said polymeric quaternary ammonium compound and said cationic polyacrylamide to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

29 – 32. (Canceled)

33. (Twice amended) A method for dewatering a sludge comprising water and thermophiles, the method comprising:

adding to the sludge a polymeric quaternary ammonium compound.

34. (Four times amended) The method of claim 33, wherein said polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight of greater than about 5,000,000.

35. (Three times amended) The method of claim 33, wherein said polymeric quaternary ammonium compound is added in an amount sufficient to form microflocs of the thermophiles.

36. (Five times amended) The method of claim 35, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

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37. (Three times amended) The method of claim 35, wherein the concentration of said polymeric quaternary ammonium compound to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

38. (Four times amended) The method of claim 35, wherein said polymeric quaternary ammonium compound is added in an amount sufficient to cause formation of said thermophiles into a developed microfloc system having a cationic overcharge, and wherein an anionic polyacrylamide is added for final floc formation.

39. (Cancelled)

40. (Three times amended) The method of claim 38, wherein the concentration of said polymeric quaternary ammonium compound to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

41. (Three times amended) A sludge composition comprising:

water;

polyacrylamide comprising a cationic or an anionic moiety;

a polymeric quaternary ammonium compound; and

solids comprising thermophiles.

42 - 43. (Cancelled)

44. (Five times amended) The sludge composition of claim 41, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

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45. (Three times amended) The sludge composition of claim 41, wherein the ratio of said polymeric quaternary ammonium compound to said polyacrylamide is in the range of about 1:10 to about 20:1.

46. (Three times amended) The sludge composition of claim 41, wherein the concentration of said polymeric quaternary ammonium compound and said polyacrylamide to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

47. (Three times amended) The sludge composition of claim 41, wherein said polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and said polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

48. (Four times amended) A sludge composition comprising:

water;

polyacrylamide comprising a cationic or an anionic moiety;

a polymeric quaternary ammonium compound; and

solids comprising flocs of thermophiles.

49 – 50. (Cancelled)

51. (Five times amended) The sludge composition of claim 48, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

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52. (Three times amended) The sludge composition of claim 48, wherein the ratio of said polymeric quaternary ammonium compound to said polyacrylamide is in the range of about 1:10 to about 20:1.

53. (Three times amended) The sludge composition of claim 48, wherein the concentration of said polymeric quaternary ammonium compound and said polyacrylamide to the percentage of solids in said sludge is in the range of about 50 ppm:1 percent to about 300 ppm:1 percent.

54. (Three times amended) The sludge composition of claim 48, wherein said polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight in the range of about 500,000 to about 3,000,000, and said polyacrylamide comprises a polyacrylamide having a molecular weight in the range of about 5,000,000 to about 15,000,000.

55. (Four times amended) A sludge composition comprising:

water;

a polymeric quaternary ammonium compound; and

solids comprising thermophiles.

56 – 57. (Cancelled)

58. (Five times amended) The sludge composition of claim 55, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

59 – 66. (Cancelled)

67. (Amended) A sludge composition comprising:

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water;thermophiles; anda polymeric quaternary ammonium compound.

68. (Five times amended) The sludge composition of claim 67, wherein said polymeric quaternary ammonium compound comprises at least one compound selected from the group consisting of poly(di-allyl di-methyl ammonium chloride) and poly(epichlorohydrin di-methyl amine).

69. (Twice amended) The sludge composition of claim 67, wherein said polymeric quaternary ammonium compound is present in an amount sufficient to form microflocs of said thermophiles.

70. (Twice amended) The sludge composition of claim 67, wherein said polymeric quaternary ammonium compound is present in an amount sufficient to cause formation of said thermophiles into a developed microfloc system having a cationic overcharge.

71. (Four times amended) The sludge composition of claim 67, wherein said polymeric quaternary ammonium compound comprises a polymeric quaternary ammonium compound having a molecular weight of at least about 5,000,000.

72. (Canceled)

73. (Amended) The method of claim 33, wherein a cationic polyacrylamide is added.

74 – 79. (Canceled)